

CLAIMS

1. A rubber composition comprising 100 parts by weight of rubber, containing 30 to 85 parts by weight of natural rubber, 0 to 65 parts by weight of an optional  
5 aromatic vinyl-conjugated diene copolymer rubber and 40 to 5 parts by weight of a conjugated diene-based rubber gel having a toluene swelling index of 16 to 70, and 60 to 120 parts by weight of carbon black.

2. A rubber composition as claimed in claim 1,  
10 wherein said conjugated diene-based rubber gel includes 75 to 99 % by weight of a conjugated diene monomer unit and 25 to 1 % by weight of an aromatic vinyl monomer unit.

3. A rubber composition as claimed in claim 1 or  
15 2, wherein said conjugated diene-based rubber gel includes 75 to 98.95 % by weight of a conjugated diene monomer unit, 25 to 1 % by weight of an aromatic vinyl monomer unit, 0.05 to 1.5 % by weight of a polyfunctional vinyl monomer unit, and 0 to 20 % by weight of optional  
20 other ethylenically unsaturated monomer units.

4. A pneumatic tire using a rubber composition according to any one of claims 1 to 3, as a high hardness reinforcing layer, which extends from a bead along a tire  
sidewall.

25 5. A pneumatic tire as claimed in claim 4 wherein said high hardness reinforcing layer has a height of 30 to 120 mm.

6. A rubber composition comprising 10 to 60 parts by weight of natural rubber, 20 to 75 parts by weight of  
30 a polybutadiene rubber containing 90 % by weight or more of a cis 1,4-structure and 40 to 5 parts by weight of a conjugated diene-based rubber gel having a toluene swelling index of 16 to 70, wherein the total amount of the rubber is 100 parts by weight.

35 7. A rubber composition as claimed in claim 6, wherein said conjugated diene-based rubber gel includes 75 to 99 % by weight of a conjugated diene monomer unit

and 25 to 1 % by weight of an aromatic vinyl monomer unit.

8. A rubber composition as claimed in claim 6 or 7, wherein said conjugated diene-based rubber gel  
5 includes of 75 to 98.95 % by weight of a conjugated diene monomer unit, 25 to 1 % by weight of an aromatic vinyl monomer unit, 0.05 to 1.5 % by weight of a polyfunctional vinyl monomer unit, and 0 to 20 % by weight of an optional ethylenically unsaturated monomer unit.

10 9. A pneumatic tire provided with the rubber composition according to any one of claims 6 to 8 at the two ends of a tire tread extrudate.

10. A tire tread rubber composition comprising 20 to 95 parts by weight of an aromatic vinyl-conjugated  
15 diene copolymer rubber (A), 5 to 50 parts by weight of a conjugated diene-based rubber gel (B) having a toluene swelling index of 16 to 70 and 0 to 50 parts by weight of another diene-based rubber (C), wherein the total weight of rubber is 100 parts by weight and wherein the  
20 copolymer rubber (A) has a glass transition temperature TgA of -40°C to -5°C and wherein the TgA and the TgB of the glass transition temperature of the conjugated diene based rubber gel (B) satisfy the following formula (1):

$$\text{TgA} - 10 < \text{TgB} < \text{TgA} + 10 \quad (1)$$

25 11. A tire tread rubber composition as claimed in claim 10, wherein said conjugated diene-based rubber gel has a Mooney viscosity  $\text{ML}_{1+4}$  (100°C) of 90 to 140.

12. A tire tread rubber composition as claimed in claim 10 or 11; wherein said conjugated diene-based  
30 rubber gel includes 48.9 to 98.9 % by weight of a conjugated diene monomer unit, 50 to 1 % by weight of an aromatic vinyl monomer unit and 0.1 to 1.5 % by weight of a polyfunctional vinyl monomer unit.

13. A tire tread rubber composition as claimed in  
35 any one of claims 10 to 12, wherein said rubber composition further contains 10 to 150 parts by weight of carbon black having a nitrogen absorption specific

surface area  $N_2SA$  of 70 to 350  $m^2/g$  and 0 to 150 parts by weight of silica.

14. A tire tread rubber composition comprising 50 to 95 parts by weight of a sulfur-vulcanizable rubber mainly composed of an aromatic vinyl-conjugated diene copolymer and 5 to 50 parts by weight of a conjugated diene-based rubber gel having a toluene swelling index  $Q$  of 16 to 70, wherein the total amount of the rubber is 100 parts by weight, and 10 to 150 parts by weight of silica and wherein the following formulae (2) and (3) are satisfied:

$$F = (R + S) / (R + T + A) \quad (2)$$

$$0.6 < F \leq 0.9 \quad (3)$$

wherein  $F$ : flexible segment fraction,  $R$ : compounding amount of rubber,  $S$ : compounding amount of silica,  $T$ : total amount of filler including silica,  $A$ : extraction amount of acetone.

15. A tire tread rubber composition as claimed in claim 14, wherein said conjugated diene-based rubber gel include 48.9 to 98.9 % by weight of a conjugated diene monomer units, 50 to 1 % by weight of an aromatic vinyl monomer unit, and 0.1 to 1.5 % by weight of a polyfunctional vinyl monomer unit.

16. A pneumatic tire using a rubber composition containing 50 % by weight or more of natural rubber and/or polyisoprene rubber and 5 to 30 % by weight of a conjugated diene-based rubber gel with a toluene swell index of 16 to 70 as a 1.5 mm to 6 mm thick undertread.

17. A pneumatic tire as claimed in claim 16, wherein said conjugated diene-based rubber gel contains 48.5 to 99 % by weight of conjugated diene monomer units, 50 to 1 % by weight of aromatic vinyl monomer units, and 0 to 1.5 % by weight of any polyfunctional vinyl monomer units.

18. A pneumatic tire as claimed in claim 16 or 17, wherein said conjugated diene-based rubber gel is a styrene-butadiene copolymer rubber gel having a styrene

content of 5 to 30 % by weight.

19. A pneumatic tire as claimed in any one of claims 16 to 18, wherein the rubber composition has a dynamic modulus  $E'$  of 6 MPa or more.